

RADICALS

Simplify the expression.

1. $\sqrt[3]{45s^3}$

$$3s\sqrt{5s}$$

2. $\sqrt[3]{196r^3}$

$$14r^2$$

3. $\sqrt[3]{450c^3}$

$$15c^2\sqrt{2c}$$

4. $\sqrt[3]{124m^4n^{10}}$

$$2m^2n^5\sqrt{31}$$

5. $11\sqrt[3]{x^3y^3}$

$$11x^3y^4\sqrt{x}$$

6. $\sqrt[3]{a^3b} \cdot \sqrt[3]{ab}$

$$a^2b$$

7. $\sqrt[3]{27xy^3} \cdot \sqrt[3]{5x^3}$

$$3y^2\sqrt{15x}$$

8. $\sqrt[3]{\frac{121}{16m^2}}$

$$\frac{11}{4m}$$

9. $\sqrt[3]{\frac{5d^2}{125}}$

$$\frac{d}{5}$$

Simplify the expression by rationalizing the denominator.

10. $\sqrt{\frac{5}{8}} \cdot \frac{\sqrt{10}}{4}$

11. $\sqrt[3]{\frac{7m^3}{11}} \cdot \frac{m^2\sqrt{77m}}{11}$

12. $\sqrt[3]{\frac{125}{4x^3}} \cdot \frac{5\sqrt{5x}}{2x^2}$

Simplify the expression.

13. $\sqrt{15} + 5\sqrt{3} - 2\sqrt{27}$

$$\sqrt{15} - \sqrt{3}$$

14. $\sqrt{7(3 - 2\sqrt{7})}$

$$3\sqrt{7} - 14$$

15. $\sqrt{2(3\sqrt{14} - \sqrt{7})}$

$$6\sqrt{7} - \sqrt{14}$$

16. $(3\sqrt{12} - 5)^2$

$$60\sqrt{3} + 133$$

17. $(8\sqrt{3} + \sqrt{2})(1 - \sqrt{3})$

$$8\sqrt{3} - \sqrt{6} + \sqrt{2} - 24$$

18. $\sqrt[3]{\frac{250m^3}{2n}}$

$$\frac{5m\sqrt{20mn}}{2n} = \frac{10m\sqrt{5mn}}{2n}$$

SOHCAHTOA

1) Find each trigonometric ratio for the given right triangle.

$$\sin Z = \frac{8}{17}$$

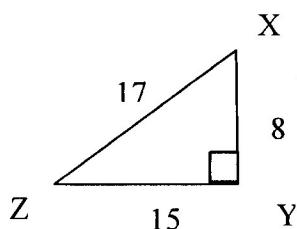
$$\cos Z = \frac{15}{17}$$

$$\tan Z = \frac{8}{15}$$

$$\sin X = \frac{15}{17}$$

$$\cos X = \frac{8}{17}$$

$$\tan X = \frac{15}{8}$$



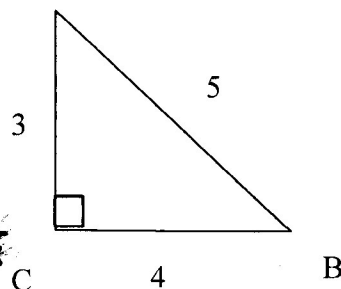
2) In the figure below, $\triangle ABC$ is a right triangle with a right angle at C. Which of the statements about this figure is NOT correct? A

a. $\cos A = \frac{3}{5}$

b. $\sin A = \frac{4}{5}$

c. $\tan A = \frac{3}{4}$

d. $\cos B = \frac{4}{5}$



Finding Missing Sides Using Trig

3) Which of the following would find the height of the lighthouse?

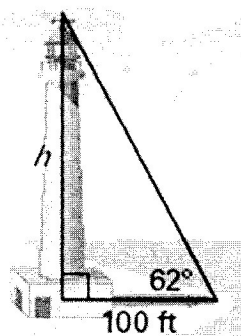
A. $62 \cdot \tan 100$

B. $100 \cdot \tan 62$

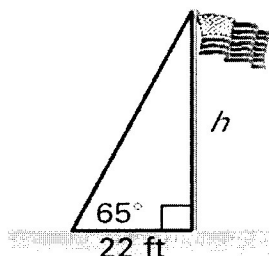
C. $100 \cdot \sin 62$

D. $\frac{100}{\sin 62}$

E. $\frac{100}{\tan 62}$

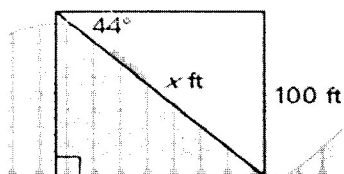


4) To calculate the height h of a flagpole, you move 22 feet from the base and record the angle of elevation to the top to be 65° . Find the flagpole's height to the nearest foot. (Use your calculator.)



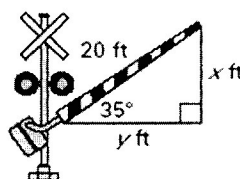
$h = 47 \text{ ft}$

5) You are at the top of a roller coaster 100 feet above the ground. The angle of depression is 44° . What is the distance x to the nearest foot?



$x = 144 \text{ ft}$

6) A railroad crossing arm that is 20 feet long is stuck with an angle of elevation of 35° . Find the lengths x and y to the nearest foot.

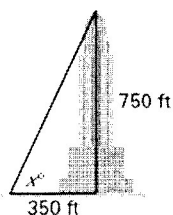


$x = 11 \text{ ft}$

$y = 16 \text{ ft}$

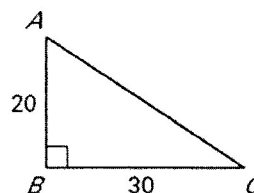
Finding Missing Angles Using Trig

7) You are standing 350 feet away from a skyscraper that is 750 feet tall. What is the angle of elevation from you to the top of the building?



$x = 64.98^\circ$

8) Use a calculator to approximate the measure of angle A to the nearest degree.

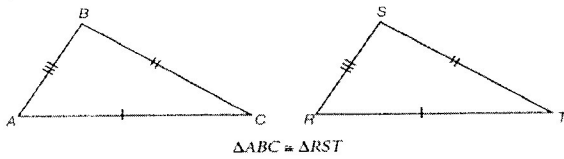


$\angle A = 56^\circ$

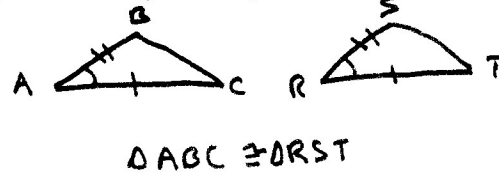
TRIANGLES

Draw an example of each triangle congruency. The first one has been done for you.

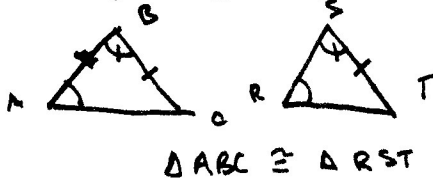
1) Two triangles congruent by SSS.



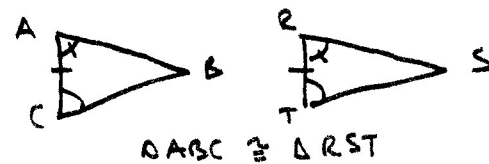
2) Two triangles congruent by SAS.



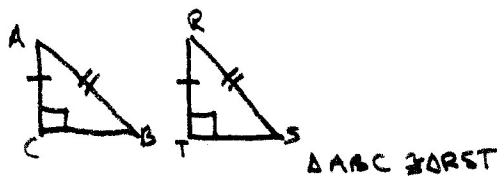
3) Two triangles congruent by AAS.



4) Two triangles congruent by ASA.



5) Two triangles are congruent by HL.

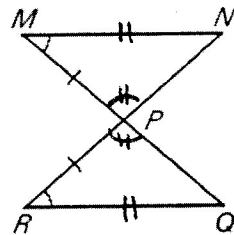


6) Which of the following is NOT a triangle congruence theorem?

- a) SSA
- b) AAS
- c) ~~SSA~~ SAS
- d) ASA

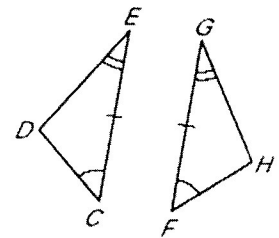
7) In the figure below, which of the following congruencies must be true?

- a) $MP \cong PQ$
- b) $RP \cong PQ$
- c) $MP \cong NP$
- d) $MN \cong RQ$
- e) $RP \cong PN$



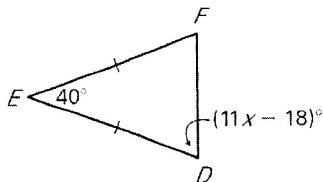
8) Which of the following congruencies must be true?

- a) $DE \cong DC$
- b) $GF \cong DE$
- c) $HF \cong GH$
- d) $DC \cong GH$
- e) $ED \cong GH$



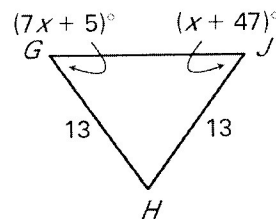
Isosceles Triangles

9) Find the value of x.



$$x = 8$$

10) Find the value of x.



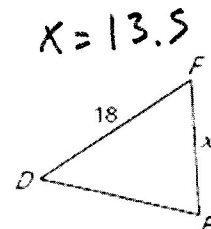
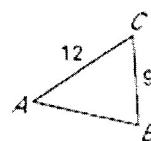
$$x = 7$$

Proportions & Similar Triangles

11) The perimeter of a rectangular table is 21 feet and the ratio of its length to its width is 5:2. Find the area of the table.

$$90 \text{ ft}^2$$

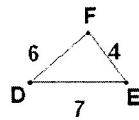
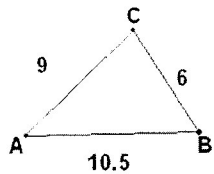
12) Find x.



$$\frac{AC}{DF} = \frac{BC}{EF}$$

$$x = 13.5$$

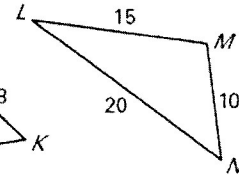
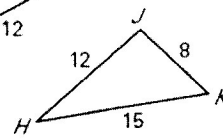
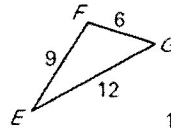
13) Are triangles ABC and DEF similar?



Yes

14) Which of the following triangles are similar?

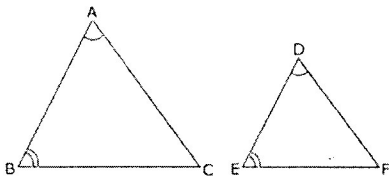
$\triangle FEG \approx \triangle MLN$



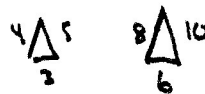
Triangle Similarity Theorems

Draw an example of each triangle similarity. The first one has been done for you.

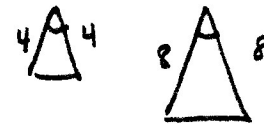
15) Two triangles similar by AA.



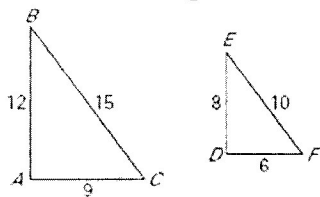
16) Two triangles similar by SSS.



17) Two triangles similar by SAS.

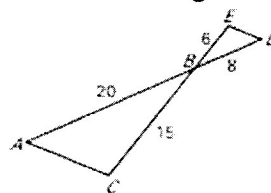


18) By what similarity theorem are these two triangles similar?



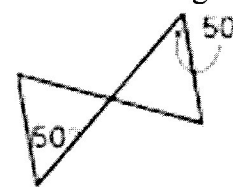
SSS

19) By what similarity theorem are these two triangles similar?



SAS

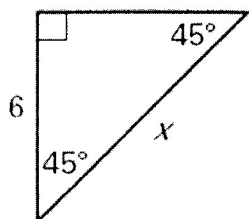
20) By what similarity theorem are these two triangles similar?



AAA

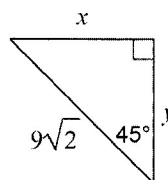
Special Right Triangles

21) Find the value of x. Leave your answer in simplest radical form.



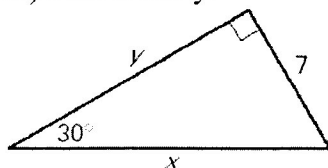
$$x = 6\sqrt{2}$$

22) Find the value of x and y.



$$x = y = 9$$

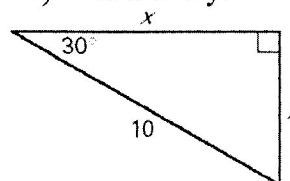
23) Find x and y.



$$y = 7\sqrt{3}$$

$$x = 14$$

24) Find x and y.

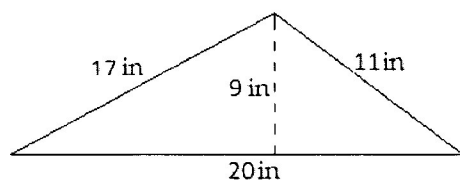


$$y = 5$$

$$x = 5\sqrt{3}$$

Don't Forget

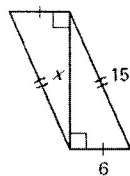
25) Find the **perimeter and area** of the triangle below.



$$P = 48 \text{ in}$$

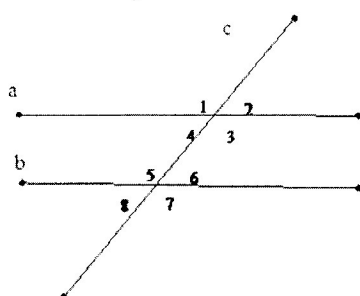
$$A = 90 \text{ in}^2$$

26) Find the missing side length. Reduce all radicals.



$$x = 3\sqrt{29}$$

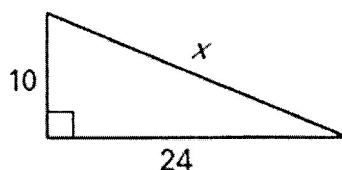
27) List all the pairs of congruent angles if lines a and b are cut by transversal c .



$$\angle 1 \cong \angle 3 \cong \angle 5 \cong \angle 7$$

$$\angle 2 \cong \angle 4 \cong \angle 6 \cong \angle 8$$

28) Find the missing side length. Reduce all radicals.



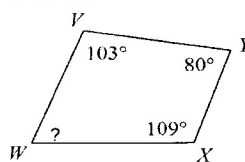
$$x = 26$$

PROPERTIES OF QUADRILATERALS

1) Which of the following statements is **NOT** true about parallelograms?

- a. consecutive angles are congruent
- b. opposite sides are congruent
- c. ~~opposite angles are congruent~~
- d. the diagonals bisect each other

2) What is the measure of angle W in the figure below?

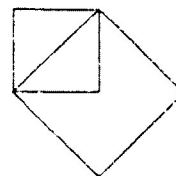


$$m\angle W = 68^\circ$$

3) The diagonal of a square is $2\sqrt{2}$ inches long. What is the area of the square, in square inches?

- F. $\sqrt{2}$
- G. 2
- H. $2\sqrt{2}$
- J. 4
- K. $4\sqrt{2}$

4) The diagonal of a smaller square is a side of a larger square, as shown below. The area of the smaller square is 36 square centimeters. What is the area of the larger square, in square centimeters?



- F. 72
- G. 90
- H. 108
- J. 162
- K. 201.5

5) What is the difference between a parallelogram and a rhombus?

Rhombus has four congruent sides and perpendicular diagonals.

6) What is the difference between a quadrilateral and a trapezoid?

Trapezoid has a set of parallel lines called its bases.

7) Which of the following is true?

- I. Kite
- II. Trapezoid
- III. Parallelogram
- IV. Rectangle

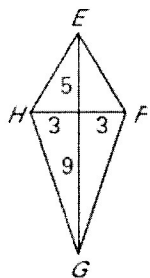
- A. I, II, III, IV have opposite angles congruent.
- B. I and II have opposite angles congruent.
- C. III and IV have opposite angles congruent.
- D. I, III, and IV have opposite angles congruent.

8) Which of the following is true?

- I. Square
- II. Rhombus
- III. Parallelogram

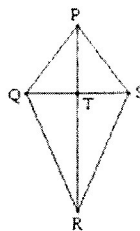
- A. I and II have congruent diagonals
- B. II and III have congruent diagonals
- C. I, II and III have congruent diagonals
- D. I has congruent diagonals

9) Find the area of the kite below.



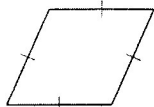
42

10) In the kite below, $PQ = 5$ cm, $PS = 5$ cm, $QS = 6$ cm, and $TR = 12$ cm. What is the area of the kite?



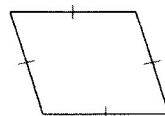
48

11) A rhombus has diagonals of 20 ft and 34 ft. What is the area of the rhombus?



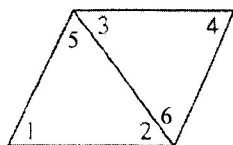
340

12) A rhombus has four equal side lengths of 13 in. The length of the longer diagonal is 24 in. What is the area of the rhombus?



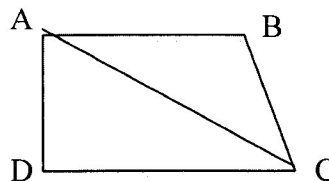
120

13) In the parallelogram below, a diagonal is shown and $\angle 2$ measures 63° and $\angle 6$ measures 42° . What is the $m\angle 4$?



$m\angle 4 = 75^\circ$

14) In the trapezoid ABCD shown below, side lengths AB and DC are parallel, $\angle DAC = 72^\circ$, $\angle D = 90^\circ$, and $\angle B = 109^\circ$. What is the measure of $\angle BCA$?



$m\angle BCA = 53^\circ$

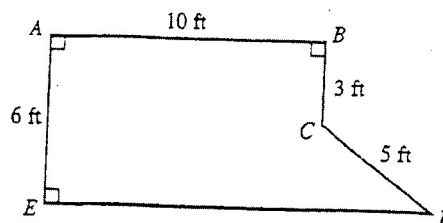
15)

One side of square $ABCD$ is 12 meters long. A rectangle with the same area as square $ABCD$ has a length of 9 meters. What is the rectangle's width, in meters?

- F. 3
 G. 16
 H. 21
 J. 108
 K. 144

16)

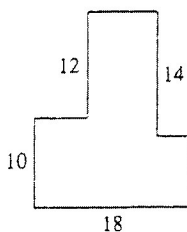
In polygon $ABCDE$ shown below, the angles at A , B , and E are right angles. What is the perimeter of the polygon, in feet?



- A. 24
 B. 36
 C. 38
 D. 41
 E. 44

17)

In the 8-sided figure below, adjacent sides meet at right angles and the lengths given are in meters. What is the perimeter of the figure, in meters?



- A. 54
 B. 80
 C. 88
 D. 116
 E. 396

18)

29. What is the area, in square inches, of the trapezoid shown below?

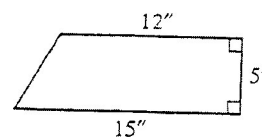
A. 60

B. $67\frac{1}{2}$

C. 75

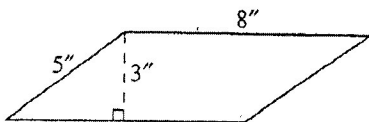
D. 80

E. Cannot be determined from the given information



19)

What is the perimeter, in inches, of the parallelogram shown below?



- F. 13
 G. 16
 H. 24
 J. 26
 K. 40

20)

48. Which of the following gives the lengths, in feet, of the legs of a right triangle that has the same area as a rectangle that is 12 feet by 9 feet?

F. 6 and 4.5

G. 6 and 18

H. 12 and 9

I. 12 and 18

K. 24 and 18

21)

A rectangle has an area of 48 square meters and a width of 6 meters. What is the perimeter, in meters, of the rectangle?

- F. 8
 G. 14
 H. 24
 J. 28
 K. 32

22)

Which of the following quadrilaterals is not a parallelogram?

I. Trapezoid

II. Kite

III. Square

IV. Rectangle

A. I

B. II and III

C. I and II

D. I, II, and III


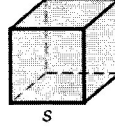
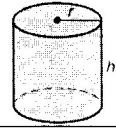
E. All of above

FILL IN THE CHART ACCORDING TO THE PROPERTIES OF THE QUADRILATERALS

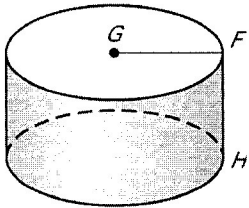
	AREA FORMULA & PERIMETER FORMULA	PARALLEL/ PERPENDICULAR SIDES? (NONE; OPPOSITE OR ADJACENT)	CONGRUENT SIDES/ CONGRUENT ANGLES (ALL, OPPOSITE OR ADJACENT)	DIAGONALS PERPENDICULAR? bisect	DIAGONALS CONGRUENT?
SQUARE	$A = s^2$ $P = 4s$	all opposite parallel all adjacent perpendicular	All sides/angles congruent	yes yes	yes
RHOMBUS	$A = \frac{d_1 \cdot d_2}{2}$ $A = bh$ $P = 4s$	all opposite parallel	All sides congruent Opp. \angle 's congruent	yes yes	no
PARALLELOGRAM	$A = bh$ $P = 2l + 2w$	all opposite parallel	Opp. sides congruent Opp. \angle 's congruent	no yes	no
RECTANGLE	$A = lw$ $P = 2l + 2w$	all opp. parallel all adj. perpendicular	Opp sides congruent All \angle 's congruent	no yes yes	yes
KITE	$A = \frac{d_1 \cdot d_2}{2}$ $P = 2s_1 + 2s_2$		Sides adjacent to bisecting angle congruent	yes Only one diagonal bisects the other	no
TRAPEZOID	$A = h \left(\frac{b_1 + b_2}{2} \right)$ $P = s + s + s + s$	bases parallel		no no	no
ISOSCELES TRAP.	$A = h \left(\frac{b_1 + b_2}{2} \right)$ $P = 2l + b_1 + b_2$	bases parallel	legs are congruent base angles are congruent	no no	yes

SURFACE AREA & VOLUME

Fill in the boxes below with either a formula or a description of how to solve.

Solid	Formula: SURFACE AREA	Formula: VOLUME	Picture
RECTANGULAR PRISM	$(2) \text{ Face } 1 + (2) \text{ Face } 2 + (2) \text{ Face } 3$	lwh	
CUBE	$6s^2$	s^3	
CYLINDER	$2\pi r^2 + 2\pi rh$	$\pi r^2 h$	

1) Use the diagram at the below to answer the questions at the right.



a. Give the mathematical name of the solid.

right cylinder

b. What kind of figure is each base?

circle

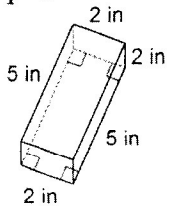
c. Name the radius of the solid.

GF

d. Name the height of the solid.

FH

2) Find the surface area and volume of the rectangular prism below.



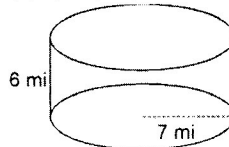
Surface Area:

$$48 \text{ in}^2$$

Volume:

$$20 \text{ in}^3$$

3) Find the surface area and volume of the cylinder below and leave it in terms of π .



Surface Area:

$$182\pi \text{ mi}^2$$

Volume:

$$294\pi \text{ mi}^3$$

4) A cube has a volume of 1728 cm^3 .

a. What is the area of one face of the cube?

$$144 \text{ in}^2$$

b. What is the full surface area of the cube?

$$864 \text{ in}^2$$

6) The volume of a cone is found using the formula

$$V = \frac{1}{3} \pi r^2 h, \text{ where } r \text{ is the radius of the base of the}$$

cone and h is the height of the cone. What is the approximate volume, in cubic centimeters, of a cone that has a circular base with a diameter of 16 cm and height of 5 cm?

A. 106

B. 209

C. 335

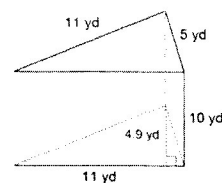
D. 1,340

E. 13,229

5) The surface area of one face of a cube is 121 m^2 . Find the volume of the cube.

$$1331 \text{ m}^3$$

7) The volume of a triangular prism is found using the formula $V = \frac{1}{2} abh$ where a is the height of the triangular base, b is the length of the base of the triangle, and h is the height of the prism. What is the volume of the prism below if the height of the triangular base is 4.9 yd, the length of the base is 11 yd, and the height of the prism is 10 yd?



a. 283.36 yd^3

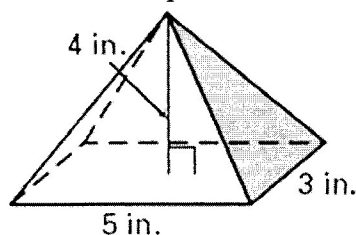
b. 296.7 yd^3

c. 269.5 yd^3

d. 139.1 yd^3

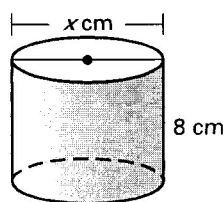
e. None of the above

8) Find the volume of the solid. Round your answer to two decimal places.



$$20 \text{ in}^3$$

9) The volume of a right cylinder is $200\pi \text{ cm}^3$. Find the value of x .



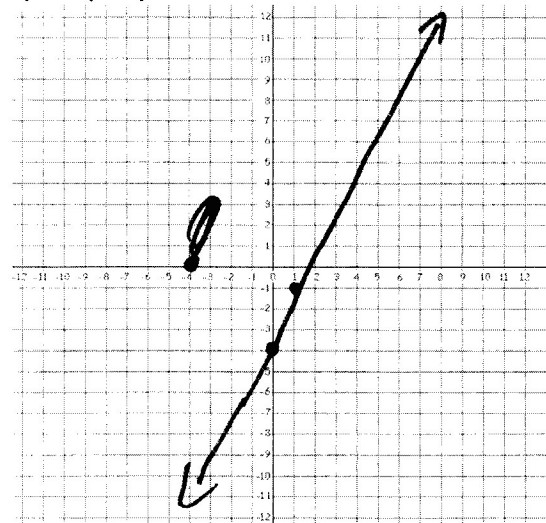
$$x = 5.14 \text{ cm}$$

$$x = 10$$

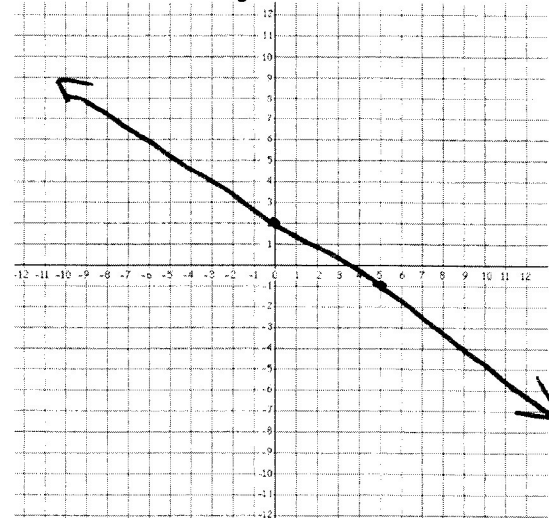
LINEAR EQUATIONS

<p>1) Write the midpoint formula:</p> $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$	<p>2) Write the distance formula:</p> $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
<p>3) Find the coordinates of the midpoint of the segment with the given endpoints.</p> <p>a. R(3, 1) and S(3, 7)</p> $(3, 4)$ <p>b. V(2, 4) and W(6, 6)</p> $(4, 5)$	<p>4) Find the distance of the segments with the given endpoints. Leave your answers in reduced radical form.</p> <p>a. A(-6, 4) and B(0, 7)</p> $3\sqrt{5}$ <p>b. X(-1, 8) and Y(6, 1)</p> $7\sqrt{2}$
<p>5) If a line goes through the point (-2, 5) and is perpendicular to $y = -2x + 8$, what is the slope of that line?</p> $m = \frac{1}{2}$	<p>6) If a line goes through the point (-2, 5) and is parallel to $y = -2x + 8$, what is the slope of that line?</p> $m = -2$
<p>7) In the standard (x, y) coordinate plane, what is the slope of a line passing through the points (-1, -8) and (0, 6)?</p> <p>A. -14</p> <p>B. -2</p> <p>C. $\frac{1}{14}$</p> <p>D. 2</p> <p><u>E. 14</u></p>	<p>8) Which statement is true of the given lines?</p> <p>Line A: $-4x + 2y = 8$</p> <p>Line B: $2x + 5y = 2$</p> <p>Line C: $3x + 6y = 8$</p> <p>A) Lines <i>a</i> and <i>b</i> are parallel</p> <p>B) Lines <i>a</i> and <i>b</i> are perpendicular</p> <p>C) Lines <i>a</i> and <i>c</i> are parallel</p> <p><u>D) Lines <i>a</i> and <i>c</i> are perpendicular</u></p> <p>E) Lines <i>b</i> and <i>c</i> are perpendicular</p>

9) Graph $y = 3x - 4$



10) Graph $y = -\frac{3}{5}x + 2$



11) Write an equation of the line that passes through $(-3, 2)$ and is parallel to the line $y = 3x + 4$?

- A) $y = 3x + 4$
- B) $y = 3x + 7$
- C) $y = 3x + 11$
- D) $y = -\frac{1}{3}x - 3$
- E) $y = -\frac{1}{3}x + 1$

12) What is the equation of a line that passes through $(1, 4)$ and $(0, -3)$?

- A) $y = 1/7x + 11$
- B) $y = -1/7x - 3$
- C) $y = 7x + 11$
- D) $y = 7x - 3$
- E) $y = -7x - 3$

13) $3y = 6x - 9$

Put the equation into slope intercept form:

$$y = 2x - 3$$

Put the equation in standard form:

$$2x - y = 3$$

Put the equation in point-slope form:

$$y + 3 = 2(x - 0)$$

14) $24 = 6y - 3x$

Put the equation into slope intercept form:

$$y = \frac{1}{2}x + 4$$

Put the equation in standard form:

$$x - 2y = -8$$

Put the equation in point-slope form:

$$y - 4 = \frac{1}{2}(x - 0)$$

15. **VANG** - The line that passes through (3,6) and (-1, -2)

VERBAL (include slope, y-intercept, x-intercept, slope-intercept form, standard form, and point-slope form)

* Full sentences *

ANALYTICAL (show work for slope, y-intercept, x-intercept, slope-intercept form, standard form, and point-slope form)

$$m = 2$$

$$y \text{ int} = 0$$

$$x \text{ int} = 0$$

$$\text{slope intercept} = y = 2x$$

$$\text{standard form} = 2x - y = 0$$

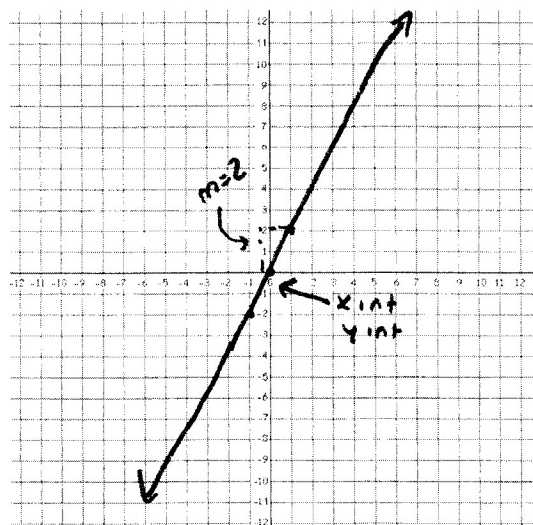
$$\text{point slope} = y - 0 = 2(x - 0)$$

NUMERICAL (include at least 5 points and label the intercepts)

x	y
0	0
1	2
2	4
3	6
4	8
5	10

← x int
y int

GRAPHICAL (label the slope, y-intercept, and x-intercept)



QUADRATIC EQUATIONS

1. Graph $y = 2x^2 - 6x + 2$

Find the axis of symmetry:

☐ $x = \frac{3}{2}$

Find the vertex (is it a minimum or maximum):

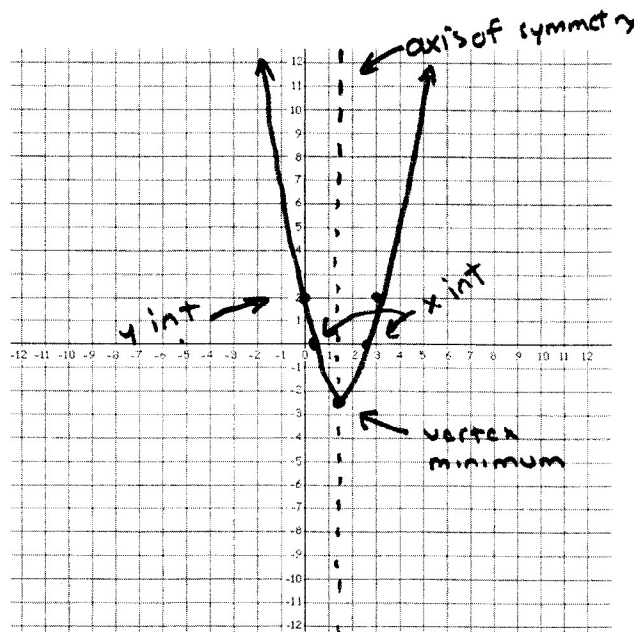
$\left(\frac{3}{2}, -\frac{5}{2}\right)$ minimum

Find the y intercept:

2

Find the x-intercepts:

2.62 0.38



2. Graph $f(x) = -\frac{1}{4}x^2 + 2x + 4$

Find the axis of symmetry:

☐ $x = 4$

Find the vertex (is it a minimum or maximum):

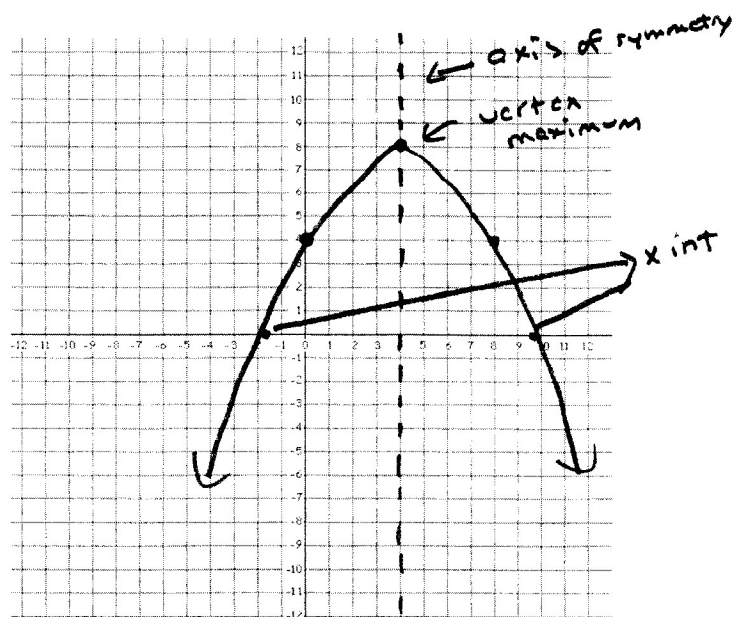
$(4, 8)$ maximum

Find the y-intercept:

4

Find the x-intercepts:

-1.66, 9.66



3. Solve the equation by factoring.

$$y = x^2 - 6x + 8$$

$$x = 4, 2$$

4. Solve the equation by factoring.

$$y = 3x^2 + 21x + 36$$

$$x = -3, -4$$

5. Which multiple choice option describes the correct transformation to the parent graph ($y = x^2$)?

$$y = -7x^2$$

- A. Shrink and shift down 1 units
- B. Stretch and shift down 3 units
- C. Stretch and reflection across the x-axis
- D. Shrink, shift down 3 units, and reflection across the x-axis
- E. Shrink and reflection across the x-axis

6. How would the graph of the function $y = x^2 + 4$ affected if the function were changed to $y = x^2 - 3$?

- A. The graph would shift 4 units up.
- B. The graph would shift 3 units down.
- C. The graph would shift 7 units down.
- D. The graph would shift 4 units to the right.
- E. The graph would shift 4 units down.

7. Solve $y = -2x^2 + 8x - 6$ by factoring.

$$x = 3, 1$$

8. What are the roots of $4z^2 = 7z - 2$?

$$\begin{aligned} a &= 4 & -4 \\ b &= -7 & 7 \\ c &= -2 & 2 \end{aligned}$$

$$z = 2, -\frac{1}{4}$$

9. Find the roots of

~~$$4x^2 - 11x + 4 = 0$$~~

$$x = \frac{1}{2}, -\frac{3}{2}$$

10.

Describe and correct the error in solving the equation below:

$$-2x^2 + 3x = 1 \quad -2x^2 + 3x - 1 = 0$$

$$x = \frac{-3 \pm \sqrt{(3)^2 - 4(-2)(1)}}{2(-2)}$$

$$= \frac{-3 \pm \sqrt{17}}{-4}$$

$$x \approx -0.28 \text{ and } x \approx 1.78$$

11. During a cliff dive competition, a diver begins a dive with his center of gravity 70 feet above the water. The initial vertical velocity of his dive is 8 feet per second.

- a. Write an equation that models the height h (in feet) of the divers center of gravity as a function of time (seconds)

$$h(t) = -16t^2 + 8t + 70$$

- b. How long after the diver begins his dive does his center of gravity reach the water?

$$2.36 \text{ seconds}$$

12. An athlete who is 6.5 feet tall throws a shot put with an initial vertical velocity of 40 feet per second. The height of the shot put can be modeled by the function $h(t) = -16t^2 + 40t + 6.5$. How long will it take for the shot put to hit the ground?

$$2.65 \text{ seconds}$$

13. **VANG**: $-3x^2 + 6x + 9$

VERBAL (include axis of symmetry, vertex and if it's a maximum or minimum, y-intercept, and x-intercepts)

Full Sentences

ANALYTICAL (show work for axis of symmetry, vertex, y-intercept, x-intercepts)

Axis of Symmetry $= 1 = x$

Vertex $= (1, 12)$

Y int: $c = 9$

X int: $3, -1$

NUMERICAL (include at least 5 points and label your vertex, y-intercept, and x-intercepts)

x	y
-1	0
0	9
1	12
3	0

GRAPHICAL (label the axis of symmetry, vertex and if it's a maximum or minimum, y-intercept, and x-intercepts)

